CETIFICATION

SDG No: FA35235
Site: BMSMC – Building 5 Area
Humacao, PR

Laboratory: Accutest, Florida
Matrix: Groundwater

SUMMARY: Samples (Table 1) were collected on the BRSMC facility – Building 5 Area. The BMSMC facility is located in Humacao, PR. Samples were taken June 27-July 5, 2016 and were analyzed in Accutest, Florida that reported the data under SDG No.: FA35235. Results were validated using the latest validation guidelines (July, 2015) of the EPA Hazardous Waste Support Section. The analyses performed are shown in Table 1. Individual data review worksheets are enclosed for each target analyte group. The data sample organic data samples summary form shows for analytes results that were qualified.

In summary the results are valid and can be used for decision taking purposes.

Table 1. Samples analyzed and analysis performed

SAMPLE ID	SAMPLE DESCRIPTION	MATRIX	ANALYSIS PERFORMED
FA35235-1	OSGP4-GWD	Groundwater	VOA TCL List*
FA35235-2	OSGP4-GWS	Groundwater	VOA TCL List*
FA35235-3	OSGP5-GWD	Groundwater	VOA TCL List*
FA35235-4	OSGP5-GWS	Groundwater	VOA TCL List*
FA35235-5	OSGP6-GWD	Groundwater	VOA TCL List*
FA35235-6	BPEB-1	AQ - Equipment Blank	VOA TCL List*
FA35235-7	BPEB-2	AQ - Equipment Blank	VOA TCL List*
FA35235-8	BPEB-3	AQ - Equipment Blank	VOA TCL List*
FA35235-9	TB070516	AQ - Trip Blank Water	VOA TCL List*

* Benzene, Methyl Tert Butyl Ether, Tert-Amyl Alcohol

Reviewer Name: Rafael Infante
Chemist License 1888

Signature:

Date: July 23, 2016

SGS Accutest

Report of Analysis

Client Sample ID:	OSGP4-GWD		
Lab Sample ID:	FA35235-1	**Date Sampled:**	06/30/16
Matrix:	AQ - Ground Water	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095742.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		83-118%
17060-07-0	1,2-Dichloroethane-D4	102%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	104%		83-118%

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ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Accutest

Report of Analysis

Client Sample ID:	OSGP4-GWS		
Lab Sample ID:	FA35235-2	**Date Sampled:**	06/30/16
Matrix:	AQ - Ground Water	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095743.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	98%		85-112%
460-00-4	4-Bromofluorobenzene	105%		83-118%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	OSGP5-GWD		
Lab Sample ID:	FA35235-3	**Date Sampled:**	07/01/16
Matrix:	AQ - Ground Water	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095744.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	99%		85-112%
460-00-4	4-Bromofluorobenzene	104%		83-118%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Accutest

Report of Analysis

Client Sample ID:	OSGP5-GWS		
Lab Sample ID:	FA35235-4	**Date Sampled:**	07/05/16
Matrix:	AQ - Ground Water	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095745.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		83-118%
17060-07-0	1,2-Dichloroethane-D4	105%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	104%		83-118%

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ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Accutest

Report of Analysis

Client Sample ID:	OSGP6-GWD		
Lab Sample ID:	FA35235-5	**Date Sampled:**	07/05/16
Matrix:	AQ - Ground Water	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095746.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	106%		83-118%

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RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Accutest

Report of Analysis

Client Sample ID:	BPEB-1		
Lab Sample ID:	FA35235-6	**Date Sampled:**	06/30/16
Matrix:	AQ - Equipment Blank	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095747.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		83-118%
17060-07-0	1,2-Dichloroethane-D4	103%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	106%		83-118%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

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Report of Analysis

Client Sample ID:	BPEB-2		
Lab Sample ID:	FA35235-7	**Date Sampled:**	07/01/16
Matrix:	AQ - Equipment Blank	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095748.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	101%		85-112%
460-00-4	4-Bromofluorobenzene	108%		83-118%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Accutest

Report of Analysis

Client Sample ID:	BPEB-3		
Lab Sample ID:	FA35235-8	**Date Sampled:**	07/05/16
Matrix:	AQ - Equipment Blank	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095749.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	100%		83-118%
17060-07-0	1,2-Dichloroethane-D4	105%		79-125%
2037-26-5	Toluene-D8	101%		85-112%
460-00-4	4-Bromofluorobenzene	107%		83-118%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

SGS Accutest

Report of Analysis

Client Sample ID:	TB070516		
Lab Sample ID:	FA35235-9	**Date Sampled:**	06/27/16
Matrix:	AQ - Trip Blank Water	**Date Received:**	07/06/16
Method:	SW846 8260C	**Percent Solids:**	n/a
Project:	BMSMC, Building 5 Area, Humacao, PR		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	N0095750.D	1	07/07/16	KM	n/a	n/a	VN4344
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.20	ug/l	
1634-04-4	Methyl Tert Butyl Ether	ND	1.0	0.20	ug/l	
75-85-4	Tert-Amyl Alcohol	ND	20	6.0	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	99%		83-118%
17060-07-0	1,2-Dichloroethane-D4	104%		79-125%
2037-26-5	Toluene-D8	100%		85-112%
460-00-4	4-Bromofluorobenzene	106%		83-118%

ND = Not detected MDL = Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range

J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

ACCUTEST LABORATORIES

CHAIN OF CUSTODY

FA35235 PAGE 1 OF 1

FL

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TEL. 407-425-6700 FAX. 407-425-0707
www.accutest.com

809960562230

Got from NJ

Client / Reporting Information	Project Information	Requested Analysis (see TEST CODE sheet)
Company Name: Anderson Mulholland & Associates	Project Name: SMSMC Phase 2A Release Assessment	
Street Address: 2700 Westchester Avenue, Suite 417	Street:	
City: Purchase State: NY Zip: 10577	City: Humacao State: PR	
Project Contact: Terry Taylor E-mail:	Project #: 828	
Phone #: 914-251-6400 Fax #:	Client Purchase Order #:	
Sampler(s) Name(s): N. Rivera, R. Stuart, R. O'Reilly, T. Taylor Phone #:	Project Manager: Terry Taylor	

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SO - Soil; SL - Sludge; SED-Sediment; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe; FB-Field Blank; EB-Equipment Blank; RB- Rinse Blank; TB-Trip Blank

#	Field ID / Point of Collection	MEOH Vial #	Collection Date	Collection Time	Sampled by	Matrix	# of bottles	HCl	MeOH	NaHSO4	NONE	DI Water	MEOH	ENCORE	8260C: Benzene, MTBE, and tert-Amyl Alcohol ONLY	LAB USE ONLY
1	OSGP 4 - GWD		6/30/16	1570	TT	GW	3	3							X	
2	OSGP 4 - GWS		6/30/16	1715	TT	GW	3	3							X	
3	OSGP 5 - GWD		7/1/16	1345	TT	GW	3	3							X	
4	OSGP 5 - GWS		7/5/16	1100	TT	GW	3	3							X	
5	OSGP 6 - GWD		7/5/16	1340	TT	GW	3	3							X	
	~~OSGP~~ AE				AE	GW	3	3							X	
															X	
															X	
6	BPEB-1		6/30/16	1545	TT	EB	3	3							X	
7	BPEB-2		7/1/16	1425	TT	EB	3	3							X	
8	FB-1		7/5/16	1205	TT	EB	3	3							X	
9	TRIP BLANK		6/27/16	0730	TT	TB	2	2							X	

Turnaround Time (Business days)

- ☐ Std. 10 Business Days
- ☐ Std. 10 Business Days (by Contract only)
- ☐ 10 Day RUSH
- ☐ 5 Day RUSH
- ☐ 3 Day EMERGENCY
- ☐ 2 Day EMERGENCY
- ☒ 1 Day EMERGENCY

Emergency & Rush TA data available VIA Lablink

Approved By (Accutest PM) / Date:

Data Deliverable Information

- ☐ Commercial "A" (Level 1)
- ☐ Commercial "B" (Level 2)
- ☒ FULL T1 (Level 3+4)
- ☐ NJ Reduced
- ☐ Commercial "C"
- ☐ NYASP Category A
- ☐ NYASP Category B
- ☐ State Forms
- ☐ EDD Format
- ☐ Other

Commercial "A" = Results Only
Commercial "B" = Results + QC Summary
NJ Reduced = Results + QC Summary + Partial Raw data

Comments / Special Instructions

Only report benzene, MTBE, and tert-Amyl Alcohol

Sample Custody must be documented below each time samples change possession, including courier delivery.

	Relinquished By	Date Time	Received By	Relinquished By	Date Time	Received By
1	[signature]	7/5/16 1700	2 Fed Ex	2 FX		3 [signature] 7/6/16 400
3			3	4		
5			6	Custody Seal # 196 ☐ Intact ☐ Not Intact	Preserved where applicable ☐	On Ice ☐ (1) Cooler Temp. 3.5

EXECUTIVE NARRATIVE

SDG No:	FA35235	Laboratory:	Accutest, Florida
Analysis:	SW846-8260C	Number of Samples:	9
Location:	BMSMC – Building 5 Area Humacao, PR		

SUMMARY: Nine (9) samples were analyzed for volatile organic compounds (VOCs) by method SW846-8260C. The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: USEPA Hazardous Waste Support Section SOP No. HW-33A Revision 0 SOM02.2. Low/Medium Volatile Data Validation. July, 2015. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

Critical issues:	**None**
Major:	**None**
Minor:	**None**

Critical findings:	**None**
Major findings:	**None**
Minor findings:	**None**

COMMENTS: Results are valid and can be used for decision making purposes.

Reviewers Name: Rafael Infante
Chemist License 1888

Signature: 

Date: July 23, 2016

SAMPLE ORGANIC DATA SAMPLE SUMMARY

Sample ID: FA35235-1
Sample location: BMSMC Building 5 Area
Sampling date: 6/30/2016
Matrix: Groundwater

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Sample ID: FA35235-2
Sample location: BMSMC Building 5 Area
Sampling date: 6/30/2016
Matrix: Groundwater

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Sample ID: FA35235-3
Sample location: BMSMC Building 5 Area
Sampling date: 7/1/2016
Matrix: Groundwater

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Sample ID: FA35235-4
Sample location: BMSMC Building 5 Area
Sampling date: 7/5/2016
Matrix: Groundwater

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Sample ID: FA35235-5
Sample location: BMSMC Building 5 Area
Sampling date: 7/5/2016
Matrix: Groundwater

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Sample ID: FA35235-6
Sample location: BMSMC Building 5 Area
Sampling date: 6/30/2016
Matrix: AQ - Equipment Blank

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Sample ID: FA35235-7
Sample location: BMSMC Building 5 Area
Sampling date: 7/1/2016
Matrix: AQ - Equipment Blank

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Sample ID: FA35235-8
Sample location: BMSMC Building 5 Area
Sampling date: 7/5/2016
Matrix: AQ - Equipment Blank

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Sample ID: FA35235-9
Sample location: BMSMC Building 5 Area
Sampling date: 6/27/2016
Matrix: AQ - Trip Blank

METHOD: 8260C

Analyte Name	Result	Units	Dilution Factor	Lab Flag	Validation	Reportable
Benzene	1.0	ug/l	1.0	-	U	Yes
Methyl Tert Butyl Ether	1.0	ug/l	1.0	-	U	Yes
Tert-Amyl Alcohol	20	ug/l	1.0	-	U	Yes

Project Number:_FA35235_____
Date:_____June_27-_July_05,_2016__
Shipping date:__July_05,_2016_____
EPA Region:_____2_____

REVIEW OF VOLATILE ORGANIC PACKAGE
Low/Medium Volatile Data Validation

The following guidelines for evaluating volatile organics were created to delineate required validation actions. This document will assist the reviewer in using professional judgment to make more informed decision and in better serving the needs of the data users. The sample results were assessed according to USEPA data validation guidance documents in the following order of precedence: .USEPA **Hazardous Waste Support Section SOP No. HW-33A Revision 0 SOM02.2. Low/Medium Volatile Data Validation.** July, 2015. The QC criteria and data validation actions listed on the data review worksheets are from the primary guidance document, unless otherwise noted.

The hardcopied (laboratory name) __Accutest_____ data package received has been reviewed and the quality control and performance data summarized. The data review for VOCs included:

Lab. Project/SDG No.: ____FA35235_____ Sample matrix: ___Groundwater_____
No. of Samples: _____9_____
Trip blank No.: _____FA35235-9_____
Field blank No.: _____-_____
Equipment blank No.:_____FA35235-6;_FA35235-7;_FA35235-8_____
Field duplicate No.:_____-_____

___X___ Data Completeness
___X___ Holding Times
___X___ GC/MS Tuning
___X___ Internal Standard Performance
___X___ Blanks
___X___ Surrogate Recoveries
___X___ Matrix Spike/Matrix Spike Duplicate
___X___ Laboratory Control Spikes
___X___ Field Duplicates
___X___ Calibrations
___X___ Compound Identifications
___X___ Compound Quantitation
___X___ Quantitation Limits

_OverallComments:___VOA_TCL_list_(SW846_8260C)_____
_____
_____

Definition of Qualifiers:

J- Estimated results
U- Compound not detected
R- Rejected data
UJ- Estimated nondetect

Reviewer:_____
Date:___July_23,_2016_____

DATA REVIEW WORKSHEETS

DATA COMPLETENESS

MISSING INFORMATION	DATE LAB. CONTACTED	DATE RECEIVED

All criteria were met _X_
Criteria were not met
and/or see below _____

HOLDING TIMES

The objective of this parameter is to ascertain the validity of the results based on the holding time of the sample from time of collection to the time of analysis.

Complete table for all samples and note the analysis and/or preservation not within criteria

SAMPLE ID	DATE SAMPLED	DATE ANALYZED	pH	ACTION
All samples analyzed within method recommended holding time. Samples properly preserved.				

Criteria

Aqueous samples – 14 days from sample collection for preserved samples (pH $\leq$ 2, 4$\pm$ 2°C), no air bubbles.
Aqueous samples – 7 days from sample collection for unpreserved samples, 4°C, no air bubbles.
Soil samples- 14 days from sample collection.
Cooler temperature (Criteria: 4 $\pm$ 2 °C): 3.5° C - OK

Actions

Aqueous samples

a. If there is no evidence that the samples were properly preserved (pH < 2, T = 4°C ± 2°C), but the samples were analyzed within the technical holding time [7 days from sample collection], no qualification of the data is necessary.
b. If there is no evidence that the samples were properly preserved, and the samples were analyzed outside of the technical holding time [7 days from sample collection], qualify detects for all volatile compounds as estimated (J) and non-detects as unusable (R).
c. If the samples were properly preserved, and the samples were analyzed within the technical holding time [14 days from sample collection], no qualification of the data is necessary.
d. If the samples were properly preserved, but were analyzed outside of the technical holding time [14 days from sample collection], qualify detects as estimated (J) and non-detects as unusable (R).
e. If air bubbles were present in the sample vial used for analysis, qualify detected compounds as estimated (J-) and non-detected compounds as estimated (UJ).

Non-aqueous samples

a. If there is no evidence that the samples were properly preserved (T < -7°C or T = 4°C ± 2°C and preserved with $NaHSO_4$), but the samples were analyzed within the technical holding time [14 days from sample collection], qualify detects for all volatile compounds as estimated (J) and non-detects as (UJ) or unusable (R) using professional judgment.

b. If the samples were properly preserved, and the samples were analyzed within the technical holding time [14 days from sample collection], no qualification of the data is necessary.

c. If there is no evidence that the samples were properly preserved, and the samples were analyzed outside of the technical holding time [14 days from sample collection], qualify detects for all volatile compounds as estimated (J) and non-detects as unusable (R).

d. If the samples were properly preserved, but were analyzed outside of the technical holding time [14 days from sample collection], qualify detects as estimated (J) and non-detects as unusable (R).

Qualify TCLP/SPLP samples

a. If the TCLP/SPLP ZHE procedure is performed within the extraction technical holding time of 14 days, detects and non-detects should not be qualified.

b. If the TCLP/SPLP ZHE procedure is performed outside the extraction technical holding time of 14 days, qualify detects as estimated (J) and non-detects as unusable (R).

c. If TCLP/SPLP aqueous samples and TCLP/SPLP leachate samples are analyzed within the technical holding time of 7 days, detects and non-detects should not be qualified.

d. If TCLP/SPLP aqueous samples and TCLP/SPLP leachate samples are analyzed outside of the technical holding time of 7 days, qualify detects as estimated (J) and non-detects as unusable (R).

Table 1. Holding Time Actions for Low/Medium Volatile Analyses - Summary

Matrix	Preserved	Criteria	Action	
			Detected Associated Compounds	Non-Detected Associated Compounds
Aqueous	No	≤ 7 days	No qualification	
	No	> 7 days	J	R
	Yes	≤ 14 days	No qualification	
	Yes	> 14 days	J	R
Non-Aqueous	No	≤ 14 days	J	Professional judgment, UJ or R
	Yes	≤ 14 days	No qualification	
	Yes/No	> 14 days	J	R
TCLP/SPLP	Yes	≤ 14 days	No qualification	
TCLP/SPLP	No	> 14 days	J	R
TCLP/SPLP	ZHE performed within the 14-day technical holding time		No qualification	
TCLP/SPLP	ZHE performed outside the 14-day technical holding time		J	R
TCLP/SPLP aqueous & TCLP/SPLP leachate	Analyzed within 7 days		No qualification	
TCLP/SPLP aqueous & TCLP/SPLP leachate	Analyzed outside 7 days		J	R
Sample temperature outside 4°C ± 2°C upon receipt at the laboratory			Use professional judgment	
Holding times grossly exceeded			J	R

All criteria were met __X__
Criteria were not met see below ____

GC/MS TUNING

The assessment of the tuning results is to determine if the sample instrumentation is within the standard tuning QC limits

__X___ The BFB performance results were reviewed and found to be within the specified criteria.

__X___ BFB tuning was performed for every 12 hours of sample analysis.

NOTES: All mass spectrometer instrument conditions must be identical to those used during the sample analysis. Background subtraction actions resulting in spectral distortions for the sole purpose of meeting the method specifications are contrary to the Quality Assurance (QA) objectives, and are therefore unacceptable.

NOTES: No data should be qualified based on BFB failure. Instances of this should be noted in the narrative.

All ion abundance ratios must be normalized to m/z 95, the nominal base peak, even though the ion abundance of m/z 174 may be up to 120% that of m/z 95.

Actions:

If samples are analyzed without a preceding valid instrument performance check, qualify all data in those samples as unusable (R).

If ion abundance criteria are not met, professional judgment may be applied to determine to what extent the data may be utilized. When applying professional judgment to this topic, the most important factors to consider are the empirical results that are relatively insensitive to location on the chromatographic profile and the type of instrumentation. Therefore, the critical ion abundance criteria for BFB are the m/z 95/96, 174/175, 174/176, and 176/177 ratios. The relative abundances of m/z 50 and 75 are of lower importance. This issue is more critical for Tentatively Identified Compounds (TICs) than for target analytes.

Note: State in the Data Review Narrative, decisions to use analytical data associated with BFB instrument performance checks not meeting contract requirements.

Note: Verify that that instrument instrument performance check criteria were achieved using techniques described in Low/Medium Volatiles Organic Analysis, Section II.D.5 of the SOM02.2 NFG, obtain additional information on the instrument performance checks. Make sure that background subtraction was performed from the BFB peak and not from background subtracting from the solvent front or from another region of the chromatogram.

Use professional judgment to determine whether associated data should be qualified based on the spectrum of the mass calibration compound.

List the samples affected:

If mass calibration is in error, all associated data are rejected.

All criteria were met __X__
Criteria were not met
and/or see below _____

CALIBRATION VERIFICATION

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing and maintaining acceptable quantitative data.

Date of initial calibration:_____07/06/16_____
Dates of continuing (initial) calibration:__07/06/16_____
Dates of continuing calibration:_____07/07/16_____
Dates of ending calibration:_____07/07/16_____
Instrument ID numbers:_____GCMSN_____
Matrix/Level:_____Aqueous/low_____

DATE	LAB FILE ID#	CRITERIA OUT RFs, %RSD, %D, r	COMPOUND	SAMPLES AFFECTED

Note: Initial calibration, initial calibration verification, and continuing calibration verification within the method and validation guidance document required performance criteria. Closing calibration check verification included in data package.

Criteria

The analyte calibration criteria in the following Table must be obtained. Analytes not meeting the criteria are qualified.

A separate worksheet should be filled for each initial curve

Initial Calibration - **Table 2. RRF, %RSD, and %D Acceptance Criteria for Initial Calibration and CCV for Low/Medium Volatile Analysis**

Analyte	Minimum RRF	Maximum %RSD	Opening Maximum %D[1]	Closing Maximum %D
Dichlorodifluoromethane	0.010	25.0	±40.0	±50.0
Chloromethane	0.010	20.0	±30.0	±50.0
Vinyl chloride	0.010	20.0	±25.0	±50.0
Bromomethane	0.010	40.0	±30.0	±50.0
Chloroethane	0.010	40.0	±25.0	±50.0
Trichlorofluoromethane	0.010	40.0	±30.0	±50.0
1,1-Dichloroethene	0.060	20.0	±20.0	±25.0
1,1,2-Trichloro-1,2,2-trifluoroethane	0.050	25.0	±25.0	±50.0
Acetone	0.010	40.0	±40.0	±50.0
Carbon disulfide	0.100	20.0	±25.0	±25.0
Methyl acetate	0.010	40.0	±40.0	±50.0
Methylene chloride	0.010	40.0	±30.0	±50.0
trans-1,2-Dichloroethene	0.100	20.0	±20.0	±25.0
Methyl tert-butyl ether	0.100	40.0	±25.0	±50.0
1,1-Dichloroethane	0.300	20.0	±20.0	±25.0
cis-1,2-Dichloroethene	0.200	20.0	±20.0	±25.0
2-Butanone	0.010	40.0	±40.0	±50.0
Bromochloromethane	0.100	20.0	±20.0	±25.0
Chloroform	0.300	20.0	±20.0	±25.0
1,1,1-Trichloroethane	0.050	20.0	±25.0	±25.0
Cyclohexane	0.010	40.0	±25.0	±50.0
Carbon tetrachloride	0.100	20.0	±25.0	±25.0
Benzene	0.200	20.0	±20.0	±25.0
1,2-Dichloroethane	0.070	20.0	±20.0	±25.0
Trichloroethene	0.200	20.0	±20.0	±25.0
Methylcyclohexane	0.050	40.0	±25.0	±50.0
1,2-Dichloropropane	0.200	20.0	±20.0	±25.0
Bromodichloromethane	0.300	20.0	±20.0	±25.0
cis-1,3-Dichloropropene	0.300	20.0	±20.0	±25.0
4-Methyl-2-pentanone	0.030	25.0	±30.0	±50.0
Toluene	0.300	20.0	±20.0	±25.0
trans-1,3-Dichloropropene	0.200	20.0	±20.0	±25.0
1,1,2-Trichloroethane	0.200	20.0	±20.0	±25.0
Tetrachloroethene	0.100	20.0	±20.0	±25.0
2-Hexanone	0.010	40.0	±40.0	±50.0
Dibromochloromethane	0.200	20.0	±20.0	±25.0
1,2-Dibromoethane	0.200	20.0	±20.0	±25.0
Chlorobenzene	0.400	20.0	±20.0	±25.0
Ethylbenzene	0.400	20.0	±20.0	±25.0

Analyte	Minimum RRF	Maximum %RSD	Opening Maximum %D[1]	Closing Maximum
m,p-Xylene	0.200	20.0	±20.0	±25.0
o-Xylene	0.200	20.0	±20.0	±25.0
Styrene	0.200	20.0	±20.0	±25.0
Bromoform	0.100	20.0	±25.0	±50.0
Isopropylbenzene	0.400	20.0	±25.0	±25.0
1,1,2,2-Tetrachloroethane	0.200	20.0	±25.0	±25.0
1,3-Dichlorobenzene	0.500	20.0	±20.0	±25.0
1,4-Dichlorobenzene	0.600	20.0	±20.0	±25.0
1,2-Dichlorobenzene	0.600	20.0	±20.0	±25.0
1,2-Dibromo-3-chloropropane	0.010	25.0	±30.0	±50.0
1,2,4-Trichlorobenzene	0.400	20.0	±30.0	±50.0
1,2,3-Trichlorobenzene	0.400	25.0	±30.0	±50.0
Deuterated Monitoring Compound				
Vinyl chloride-d_3	0.010	20.0	±30.0	±50.0
Chloroethane-d_5	0.010	40.0	±30.0	±50.0
1,1-Dichloroethene-d_2	0.050	20.0	±25.0	±25.0
2-Butanone-d_5	0.010	40.0	±40.0	±50.0
Chloroform-d	0.300	20.0	±20.0	±25.0
1,2-Dichloroethane-d_4	0.060	20.0	±25.0	±25.0
Benzene-d_6	0.300	20.0	±20.0	±25.0
1,2-Dichloropropane-d_6	0.200	20.0	±20.0	±25.0
Toluene-d_8	0.300	20.0	±20.0	±25.0
trans-1,3-Dichloropropene-d_4	0.200	20.0	±20.0	±25.0
2-Hexanone-d_5	0.010	40.0	±40.0	±50.0
1,1,2,2-Tetrachloroethane-d_2	0.200	20.0	±25.0	±25.0
1,2-Dichlorobenzene-d_4	0.400	20.0	±20.0	±25.0

[1] If a closing CCV is acting as an opening CCV, all target analytes and DMCs must meet the requirements for an opening CCV.

Actions:

1. If any volatile target compound has an RRF value less than the minimum in the table, use professional judgment for detects, based on mass spectral identification, to qualify the data as estimated (J+ or R).
   a. If any volatile target compound has an RRF value less than the minimum criterion, qualify non-detected compounds as unusable (R).
   b. If any of the volatile target compounds listed in the Table has %RSD greater than the criteria, qualify detects as estimated (J), and non-detected compounds using professional judgment.
   c. If the volatile target compounds meet the acceptance criteria for RRF and the %RSD, no qualification of the data is necessary.

d. No qualification of the data is necessary on the DMC RRF and %RSD data alone. Use professional judgment and follow the guidelines in Action 2 to evaluate the DMC RRF and %RSD data in conjunction with the DMC recoveries to determine the need for qualification of data.

2. At the reviewer's discretion, and based on the project-specific Data Quality Objectives (DQOs), a more in-depth review may be considered using the following guidelines:

a. If any volatile target compound has a %RSD greater than the maximum criterion in the Table, and if eliminating either the high or the low-point of the curve does not restore the %RSD to less than or equal to the required maximum:
   i. Qualify detects for that compound(s) as estimated (J).
   ii. Qualify non-detected volatile target compounds using professional judgment.

b. If the high-point of the curve is outside of the linearity criteria (e.g., due to saturation):
   i. Qualify detects outside of the linear portion of the curve as estimated (J).
   ii. No qualifiers are required for detects in the linear portion of the curve.
   iii. No qualifiers are required for volatile target compounds that were not detected.

c. If the low-point of the curve is outside of the linearity criteria:
   i. Qualify low-level detects in the area of non-linearity as estimated (J).
   ii. No qualifiers are required for detects in the linear portion of the curve.
   iii. For non-detected volatile compounds, use the lowest point of the linear portion of the curve to determine the new quantitation limit.

Note: If the laboratory has failed to provide adequate calibration information, inform the Region's designated representative to contact the laboratory and request the necessary information. If the information is not available, the reviewer must use professional judgment to assess the data.

State in the Data Review Narrative, if possible, the potential effects on the data due to calibration criteria exceedance.

Note, for the Laboratory COR action, if calibration criteria are grossly exceeded.

Table. Initial Calibration Actions for Low/Medium Volatile Analysis – Summary

Criteria	Action	
	Detect	Non-detect
Initial Calibration not performed at specified frequency and sequence	Use professional judgment R	Use professional judgment R
Initial Calibration not performed at the specified concentrations	J	UJ
RRF < Minimum RRF in Table for target analyte	Use professional judgment J+ or R	R
RRF > Minimum RRF in Table for target analyte	No qualification	No qualification
%RSD > Maximum %RSD in Table for target analyte	J	Use professional judgment
%RSD ≤ Maximum %RSD in Table for target analyte	No qualification	No qualification

All criteria were met _X___
Criteria were not met
and/or see below _____

Continuing Calibration Verification (CCV)

NOTE: Verify that the CCV was run at the required frequency (an opening and closing CCV must be run within 12-hour period) and the CCV was compared to the correct initial calibration. If the mid-point standard from the initial calibration is used as an opening CCV, verify that the result (RRF) of the mid-point standard was compared to the average RRF from the correct initial calibration.

The closing CCV used to bracket the end of a 12-hour analytical sequence may be used as the opening CCV for the new 12-hour analytical sequence, provided that all the technical acceptance criteria are met for an opening CCV (see criteria show before in the Table) . If the closing CCV does not meet the technical acceptance criteria for an opening CCV, then a BFB tune followed by an opening CCV is required and the next 12-hour time period begins with the BFB tune.

All DMCs must meet RRF criteria. No qualification of the data is necessary on the DMCs RRF and %RSD/%D data alone. However, use professional judgment to evaluate the DMC and %RSD/%D data in conjunction with the DMC recoveries to determine the need of qualification the data.

Action:

1. If a CCV (opening and closing) was not run at the appropriate frequency, qualify data using professional judgment.

2. Qualify all volatile target compounds in Table shown before using the following criteria:

   a. For an opening CCV, if any volatile target compound has an RRF value less than the minimum criterion, use professional judgment for detects, based on mass spectral identification, to qualify the data as estimated (J) and qualify non-detected compounds as unusable (R).
   b. For a closing CCV, if any volatile target compound has an RRF value less than the criteria, use professional judgment for detects based on mass spectral identification to qualify the data as estimated (J), and qualify non-detected compounds as unusable (R).
   c. For an opening CCV, if the Percent Difference value for any of the volatile target compounds is outside the limits in calibration criteria Table shown before, qualify detects as estimated (J) and non-detected compounds as estimated (UJ).
   d. For a closing CCV, if the Percent Difference value for any volatile target compound is outside the limits in calibration criteria table, qualify detects as estimated (J) and non-detected compounds as estimated (UJ).
   e. If the volatile target compounds meet the acceptable criteria for RRF and the Percent Difference, no qualification of the data is necessary.

f. No qualification of the data is necessary on the DMC RRF and the Percent Difference data alone. Use professional judgment to evaluate the DMC RRF and Percent Difference data in conjunction with the DMC recoveries to determine the need for qualification of data.

Notes: If the laboratory has failed to provide adequate calibration information, inform the Region's designated representative to contact the laboratory and request the necessary information. If the information is not available, the reviewer must use professional judgment to assess the data.

State in the Data Review Narrative, if possible, the potential effects on the data due to calibration criteria exceedance.

Note, for Contract Laboratory COR action, if calibration criteria are grossly exceeded.

Table. Continuing Calibration Actions for Low/Medium Volatile Analysis – Summary

Criteria for Opening CCV	Criteria for Closing CCV	Action	
		Detect	Non-detect
CCV not performed at required frequency	CCV not performed at required frequency	Use professional judgment R	Use professional judgment R
CCV not performed at specified concentration	CCV not performed at specified concentration	Use professional judgment	Use professional judgment
RRF < Minimum RRF in Table 2 for target analyte	RRF < Minimum RRF in Table for target analyte	Use professional judgment J or R	R
RRF ≥ Minimum RRF in Table 2 for target analyte	RRF ≥ Minimum RRF in Table for target analyte	No qualification	No qualification
%D outside the Opening Maximum %D limits in Table 2 for target analyte	%D outside the Closing Maximum %D limits in Table for target analyte	J	UJ
%D within the inclusive Opening Maximum %D limits in Table 2 for target analyte	%D within the inclusive Closing Maximum %D limits in Table for target analyte	No qualification	No qualification

All criteria were met ___X___
Criteria were not met
and/or see below _____

BLANK ANALYSIS RESULTS (Sections 1 & 2)

The assessment of the blank analysis results is to determine the existence and magnitude of contamination problems. The criteria for evaluation of blanks apply only to blanks associated with the samples, including trip, equipment, and laboratory blanks. If problems with any blanks exist, all data associated with the case must be carefully evaluated to determine whether or not there is an inherent variability in the data for the case, or if the problem is an isolated occurrence not affecting other data.

List the contamination in the blanks below. High and low levels blanks must be treated separately.

The concentration of a target analyte in any blank must not exceed its Contract Required Quantitation Limit (CRQL) (2x CRQLs for Methylene chloride, Acetone, and 2-Butanone). TIC concentration in any blanks must be ≤ 5.0 µg/L for water (0.0050 mg/L for TCLP leachate) and ≤ 5.0 µg/kg for soil matrices.

Laboratory blanks

The method blank, like any other sample in the SDG, must meet the technical acceptance criteria for sample analysis.

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
_____	_____	_____	_____	_____
_No_target_analyte_detected_in_method_blanks._			_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

~~Field~~/Equipment/Trip blank

If field or trip blanks are present, the data reviewer should evaluate this data in a similar fashion as the method blanks.

DATE ANALYZED	LAB ID	LEVEL/ MATRIX	COMPOUND	CONCENTRATION UNITS
_No_target_analytes_detected_in_the_trip/equipment_blanks._No_field_blank_analyzed_with_this__ _data_package._____				
_____				
_____				
_____				
_____				
_____				

All criteria were met _X_
Criteria were not met
and/or see below ____

BLANK ANALYSIS RESULTS (Section 3)

Blank Actions

Note: All fields blank results associated with a particular group of samples (may exceed one per case) must be used to qualify data. Trip blanks are used to qualify only those samples with which they were shipped. Blanks may not be qualified because of contamination in another blank. Field blanks and trip blanks must be qualified for system monitoring compounds, instrument performance criteria, and spectral or calibration QC problems.

Samples taken from a drinking water tap do not have associated field blanks.

When applied as described in the Table below, the contaminant concentration in the blank is multiplied by the sample dilution factor.

Table. Blank and TCLP/SPLP LEB Actions for Low/Medium Volatile Analysis

Blank Type	Blank Result	Sample Result	Action for Samples
Method, Storage, Field, Trip, TCLP/SPLP LEB, Instrument**	Detects	Not detected	No qualification required
	< CRQL *	< CRQL*	Report CRQL value with a U
		≥ CRQL*	No qualification required
	> CRQL *	< CRQL*	Report CRQL value with a U
		≥ CRQL* and ≤ blank concentration	Report blank value for sample concentration with a U
		≥ CRQL* and > blank concentration	No qualification required
	= CRQL*	≤ CRQL*	Report CRQL value with a U
		> CRQL*	No qualification required
	Gross contamination	Detects	Report blank value for sample concentration with a U

* 2x the CRQL for methylene chloride, 2-butanone and acetone.
** Qualifications based on instrument blank results affect only the sample analyzed immediately after the sample that has target compounds that exceed the calibration range or non-target compounds that exceed 100 µg/L.

Action Levels (ALs) should be based upon the highest concentration of contaminant determined in any blank. Do not qualify any blank with another blank. The ALs for samples which have been diluted should be corrected for the sample dilution factor and/or % moisture, where applicable. No positive sample results should be reported unless the concentration of the compound in the samples exceeds the ALs:

Notes:

High and low level blanks must be treated separately
Compounds qualified "U" for blank contamination are still considered "hits" when qualifying for calibration criteria.

CONTAMINATION SOURCE/LEVEL	COMPOUND	CONC/UNITS	AL/UNITS	SQL	AFFECTED SAMPLES

All criteria were met _X_
Criteria were not met
and/or see below ____

DEUTERATED MONITORING COMPOUNDS (DMCs)

Laboratory performance of individual samples is established by evaluation of surrogate spike (DMCs) recoveries. All samples are spiked with surrogate compounds prior to sample analysis. The accuracy of the analysis is measured by the surrogate percent recovery. Since the effects of the sample matrix are frequently outside the control of the laboratory and may present relatively unique problems, the validation of data is frequently subjective and demands analytical experience and professional judgment.

Table. Volatile Deuterated Monitoring Compounds (DMCs) and Recovery Limits

DMC	%R for Water Sample	%R for Soil Sample
Vinyl chloride-d3	60-135	30-150
Chloroethane-d5	70-130	30-150
1,1-Dichloroethene-d2	60-125	45-110
2-Butanone-d5	40-130	20-135
Chloroform-d	70-125	40-150
1,2-Dichloroethane-d4	70-125	70-130
Benzene-d6	70-125	20-135
1,2-Dichloropropane-d6	70-120	70-120
Toluene-d8	80-120	30-130
trans-1,3-Dichloropropene-d4	60-125	30-135
2-Hexanone-d5	45-130	20-135
1,1,2,2-Tetrachloroethane-d2	65-120	45-120
1,2-Dichlorobenzene-d4	80-120	75-120

NOTE: The recovery limits for any of the compounds listed in the above Table may be expanded at any time during the period of performance if the United States Environmental Protection Agency (EPA) determines that the limits are too restrictive.

Action:

Are recoveries for DMCs in volatile samples and blanks must be within the limits specified in the Table above. **Yes**? or No?

NOTE: The recovery limits for any of the compounds listed in the Table above may be expanded at any time during the period of performance if USEPA determines that the limits are too restrictive.

List the DMCs that may fail to meet the recovery limits

Sample ID	Date	DMCs	% Recovery	Action

DMCs recoveries within the required limits and within the guidance document performance criteria (80 – 120). Other non-deuterated surrogates added to the samples within laboratory control limits.

Note: Any sample which has more than 3 DMCs outside the limits must be reanalyzed.

Action:

1. For any recovery greater than the upper acceptance limit:
   a. Qualify detected associated volatile target compounds as estimated high (J+).
   b. Do not qualify non-detected associated volatile target compounds.
2. For any recovery greater than or equal to 10%, and less than the lower acceptance limit:
   a. Qualify detected associated volatile target compounds as estimated low (J-).
   b. Qualify non-detected associated volatile target compounds as estimated (UJ).
3. For any recovery less than 10%:
   a. Qualify detected associated volatile target compounds as estimated low (J-).
   b. Qualify non-detected associated volatile target compounds as unusable (R).
4. For any recovery within acceptance limits, no qualification of the data is necessary.
5. In the special case of a blank analysis having DMCs out of specification, the reviewer must give special consideration to the validity of associated sample data. The basic concern is whether the blank problems represent an isolated problem with the blank alone, or whether there is a fundamental problem with the analytical process. For example, if one or more samples in the batch show acceptable DMC recoveries, the reviewer may choose to consider the blank problem to be an isolated occurrence. However, even if this judgment allows some use of the affected data, note analytical problems for Contract Laboratory COR action.
6. If more than three DMCs are outside of the recovery limits for Low/Medium volatiles analysis and the sample was not reanalyzed, note under Contract Problems/Non-Compliance.

Table. Deuterated Monitoring Compound (DMC) Recovery Actions for Low/Medium Volatiles Analyses – Summary

Criteria	Action	
	Detect Associated Compounds	Non-detected Associated Compounds
%R < 10%	J-	R
10% ≤ %R < Lower Acceptance Limit	J-	UJ
Lower Acceptance Limit ≤ %R ≤ Upper Acceptance Limit	No qualification	No qualification
%R > Upper Acceptance Limit	J+	No qualification

TABLE. VOLATILE DEUTERATED MONITORING COMPOUNDS (DMCs) AND THE ASSOCIATED TARGET COMPOUNDS

Vinyl chloride-d_3 (DMC-1)	**Chloroethane-d_5 (DMC-2)**	**1,1-Dichloroethene-d_2 (DMC-3)**
Vinyl chloride	Dichlorodifluoromethane Chloromethane Bromomethane Chloroethane Carbon disulfide	trans-1,2-Dichloroethene cis-1,2-Dichloroethene 1,1-Dichloroethene
2-Butanone-d_5 (DMC-4)	**Chloroform-d (DMC-5)**	**1,2-Dichloroethane-d_4 (DMC-6)**
Acetone 2-Butanone	1,1-Dichloroethane Bromochloromethane Chloroform Dibromochloromethane Bromoform	Trichlorofluoromethane 1,1,2-Trichloro-1,2,2-trifluoroethane Methyl acetate Methylene chloride Methyl-tert-butyl ether 1,1,1-Trichloroethane Carbon tetrachloride 1,2-Dibromoethane 1,2-Dichloroethane
Benzene-d_6 (DMC-7)	**1,2-Dichloropropane-d_6 (DMC-8)**	**Toluene-d_8 (DMC-9)**
Benzene	Cyclohexane Methylcyclohexane 1,2-Dichloropropane Bromodichloromethane	Trichloroethene Toluene Tetrachloroethene Ethylbenzene o-Xylene m,p-Xylene Styrene Isopropylbenzene
trans-1,3-Dichloropropene-d_4 (DMC-10)	**2-Hexanone-d_5 (DMC-11)**	**1,1,2,2-Tetrachloroethane-d_2 (DMC-12)**
cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,1,2-Trichloroethane	4-Methyl-2-pentanone 2-Hexanone	1,1,2,2,-Tetrachloroethane 1,2-Dibromo-3-chloropropane
1,2-Dichlorobenzene-d_4 (DMC-13)		
Chlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,2-Dichlorobenzene 1,2,4-Trichlorobenzene 1,2,3-Trichlorobenzene		

All criteria were met __X__
Criteria were not met
and/or see below _____

MATRIX SPIKE/MATRIX SPIKE DUPLICATE (MS/MSD)

This data is generated to determine long term precision and accuracy in the analytical method for various matrices. This data alone cannot be used to evaluate the precision and accuracy of individual samples. If any % R in the MS or MSD falls outside the designated range, the reviewer should determine if there are matrix effects, i.e. LCS data are within the QC limits but MS/MSD data are outside QC limit.

NOTES: Data for MS and MSDs will not be present unless requested by the Region. Notify the Contract Laboratory COR if a field or trip blank was used for the MS and MSD.

For a Matrix Spike that does not meet criteria, apply the action to only the field sample used to prepare the Matrix Spike sample. If it is clearly stated in the data validation materials that the samples were taken through incremental sampling or some other method guaranteeing the homogeneity of the sample group, then the entire sample group may be qualified.

1. MS/MSD Recoveries and Precision Criteria

The laboratory should use one MS and a duplicate analysis of an unspiked field sample if target analytes are expected in the sample. If target analytes are not expected, MS/MSD should be analyzed.

List the %Rs, RPD of the compounds which do not meet the criteria.

Sample ID:_ FA35235-1MS/1MSD_____ Matrix/Level:_____Aqueous_____

The QC reported here applies to the following samples: Method: **SW846 8260C**
FA35235-1, FA35235-2, FA35235-3, FA35235-4, FA35235-5; FA35235-6, FA35235-7, FA35235-8, FA35235-9

Compound	FA35235-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD

Note: MS/MSD % recoveries and RPD within laboratory control limits.

Note:

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

1. No qualification of the data is necessary on MS and MSD data alone. However, using professional judgment, the validator may use the MS and MSD results in conjunction with other QC criteria and determine the need for some qualification of the data.

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

MS/MSD criteria apply only to the unspiked sample, its dilutions, and the associated MS/MSD samples:

If the % R for the affected compounds were < LL (or 70 %), qualify positive results (J) and nondetects (UJ).
If the % R for the affected compounds were > UL (or 130 %), only qualify positive results (J).
If 25 % or more of all MS/MSD %R were < LL (or 70 %) or if two or more MS/MSD %Rs were < 10%, qualify all positive results (J) and reject nondetects (R).

A separate worksheet should be used for each MS/MSD pair.

All criteria were met _X___
Criteria were not met
and/or see below _____

LABORATORY CONTROL SAMPLE (LCS) ANALYSIS

This data is generated to determine accuracy of the analytical method for various matrices.

1. LCS Recoveries Criteria

Where LCS spiked with the same analyte at the same concentrations as the MS/MSD? **Yes** or No. If no make note in data review memo.
List the %R of compounds which do not meet the criteria

LCS ID COMPOUND % R QC LIMIT

Recoveries(blank_spike)_within_laboratory_control_limits._____
_____
_____
_____
_____
_____
_____

Note:

* QC limits are laboratory in-house performance criteria, LL = lower limit, UL = upper limit.
* If QC limits are not available, use limits of 70 – 130 %.

Actions:

QUALITY	%R < LL	%R > UL
Positive results	J	J
Nondetects results	R	Accept

All analytes in the associated sample results are qualified for the following criteria.

If 25 % of the LCS recoveries were < LL (or 70 %), qualify all positive results (j) and reject nondetects (R).
If two or more LCS were below 10 %, qualify all positive results as (J) and reject nondetects (R).

2. Frequency Criteria:

Where LCS analyzed at the required frequency and for each matrix? Yes or No.
If no, the data may be affected. Use professional judgment to determine the severity of the effect and qualify data accordingly. Discuss any actions below and list the samples affected.

All criteria were met __X___
Criteria were not met
and/or see below _____

IX. FIELD/LABORATORY DUPLICATE PRECISION

Sample IDs: _____-_____ Matrix:_____-_____

Field/laboratory duplicates samples may be taken and analyzed as an indication of overall precision. These analyses measure both field and lab precision; therefore, the results may have more variability than laboratory duplicates which only laboratory performance. It is also expected that soil duplicate results will have a greater variance than water matrices due to difficulties associated with collecting identical field duplicate samples.

The project QAPP should be reviewed for project-specific information.

> **NOTE:** In the absence of QAPP guidance for validating data from field duplicates, the following action will be taken.

Identify which samples within the data package are field duplicates. Estimate the relative percent difference (RPD) between the values for each compound. Use professional judgment to note large RPDs (> 50%) in the narrative.

COMPOUND	SQL	SAMPLE CONC.	DUPLICATE CONC.	RPD	ACTION
No field/laboratory duplicate analyzed with this data package. MS/MSD % recovery RPD used to assess precision. RPD within required criteria, ≤ 50 % for target analytes detected at concentration > 5x the SQL or the reporting in sample and duplicate.					

Actions:

Qualify as estimated positive results (J) and nondetects (UJ) for the compound that exceeded the above criteria. For organics, only the sample and duplicate will be qualified.

If an RPD cannot be calculated because one or both of the sample results is not detected, the following actions are suggested based on professional judgment:

If one sample result is not detected and the other is greater than 5x the SQL qualify (J/UJ).

If one sample value is not detected and the other is greater than 5x the SQL and the SQLs for the sample and duplicate are significantly different, use professional judgment to determine if qualification is appropriate.

If one sample value is not detected and the other is less than 5x, use professional judgment to determine if qualification is appropriate.

If both sample and duplicate results are not detected, no action is needed.

All criteria were met __X__
Criteria were not met
and/or see below _____

X. INTERNAL STANDARD PERFORMANCE

The assessment of the internal standard (IS) parameter is used to assist the data reviewer in determining the condition of the analytical instrumentation.

DATE	SAMPLE ID	IS OUT	IS AREA	ACCEPTABLE RANGE	ACTION

Internal standard area counts within the required criteria for all samples.

Action:

1. If an internal standard area count for a sample or blank is greater than 200.0% of the area for the associated standard (opening CCV or mid-point standard from initial calibration) (see Table below):
   a. Qualify detects for compounds quantitated using that internal standard as estimated low (J-).
   b. Do not qualify non-detected associated compounds.
2. If an internal standard area count for a sample or blank is less than 20.0% of the area for the associated standard (opening CCV or mid-point standard from initial calibration):
   a. Qualify detects for compounds quantitated using that internal standard as estimated high (J+).
   b. Qualify non-detected associated compounds as unusable (R).
3. If an internal standard area count for a sample or blank is greater than or equal to 20.0%, and less than or equal to 200% of the area for the associated standard opening CCV or mid-point standard from initial calibration, no qualification of the data is necessary.
4. If an internal standard RT varies by more than 30.0 seconds: Examine the chromatographic profile for that sample to determine if any false positives or negatives exist. For shifts of a large magnitude, the reviewer may consider partial or total rejection of the data for that sample fraction. Detects should not need to be qualified as unusable (R) if the mass spectral criteria are met.
5. If an internal standard RT varies by less than or equal to 30.0 seconds, no qualification of the data is necessary.

Note: Inform the Contract Laboratory Program Project Officer (CLP PO) if the internal standard performance criteria are grossly exceeded. Note in the Data Review Narrative potential effects on the data resulting from unacceptable internal standard performance.

6. If required internal standard compounds are not added to a sample or blank, qualify detects and non-detects as unusable (R).
7. If the required internal standard compound is not analyzed at the specified concentration in a sample or blank, use professional judgment to qualify detects and non-detects.

Table. Internal Standard Actions for Low/Medium Volatiles Analyses - Summary

Criteria	Action	
	Detected Associated Compounds*	Non-detected Associated Compounds*
Area counts > 200% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J-	No qualification
Area counts < 20% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	J+	R
Area counts ≥ 50% but ≤ 200% of 12-hour standard (opening CCV or mid-point standard from initial calibration)	No qualification	
RT difference > 30.0 seconds between samples and 12-hour standard (opening CCV or mid-point standard from initial calibration)	R **	R
RT difference ≤ 30.0 seconds between samples and 12-hour standard (opening CCV or mid-point standard from initial calibration)	No qualification	

* For volatile compounds associated to each internal standard, see TABLE - VOLATILE TARGET ANALYTES, DEUTERATED MONITORING COMPOUNDS WITH ASSOCIATED INTERNAL STANDARDS FOR QUANTITATION in SOM02.2, Exhibit D, available at: http://www.epa.gov/superfund/programs/clp/download/som/som22d.pdf
** Detects should not need to be qualified as unusable (R) if the mass spectral criteria are met.

All criteria were met __X__
Criteria were not met
and/or see below ____

TARGET COMPOUND IDENTIFICATION

Criteria:

Is the Relative Retention Times (RRTs) of reported compounds within ±0.06 RRT units of the standard RRT [opening Continuing Calibration Verification (CCV) or mid-point standard from the initial calibration]. Yes? or No?

List compounds not meeting the criteria described above:

Sample ID	Compounds	Actions

Mass spectra of the sample compound and a current laboratory-generated standard [i.e., the mass spectrum from the associated calibration standard (opening CCV or mid-point standard from initial calibration)] must match according to the following criteria:

a. All ions present in the standard mass spectrum at a relative intensity greater than 10% must be present in the sample spectrum.

b. The relative intensities of these ions must agree within ±20% between the standard and sample spectra (e.g., for an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30-70%).

c. Ions present at greater than 10% in the sample mass spectrum, but not present in the standard spectrum, must be evaluated by a reviewer experienced in mass spectral interpretation.

List compounds not meeting the criteria described above:

Sample ID	Compounds	Actions

Action:

1. The application of qualitative criteria for GC/MS analysis of target compounds requires professional judgment. It is up to the reviewer's discretion to obtain additional information from the laboratory. If it is determined that incorrect identifications were made, qualify all such data as unusable (R).

2. Use professional judgment to qualify the data if it is determined that cross-contamination has occurred.

3. Note in the Data Review Narrative any changes made to the reported compounds or concerns regarding target compound identifications. Note, for Contract Laboratory COR action, the necessity for numerous or significant changes.

TENTATIVELY IDENTIFIED COMPOUNDS (TICS)

NOTE: Tentatively identified compounds should only be evaluated when requested by a party from outside of the Hazardous Waste Support Section (HWSS).

List TICs

Sample ID	Compound	Sample ID	Compound

Action:

1. Qualify all TIC results for which there is presumptive evidence of a match (e.g. greater than or equal to 85% match) as tentatively identified (NJ), with approximated concentrations. TICs labeled "unknown" are qualified as estimated (J).
2. General actions related to the review of TIC results are as follows:
   a. If it is determined that a tentative identification of a non-target compound is unacceptable, change the tentative identification to "unknown" or another appropriate identification, and qualify the result as estimated (J).
   b. If all contractually-required peaks were not library searched and quantitated, the Region's designated representative may request these data from the laboratory.
3. In deciding whether a library search result for a TIC represents a reasonable identification, use professional judgment. If there is more than one possible match, report the result as "either compound X or compound Y". If there is a lack of isomer specificity, change the TIC result to a nonspecific isomer result (e.g., 1,3,5-trimethyl benzene to trimethyl benzene

isomer) or to a compound class (e.g., 2-methyl, 3-ethyl benzene to a substituted aromatic compound).

4. The reviewer may elect to report all similar compounds as a total (e.g., all alkanes may be summarized and reported as total hydrocarbons).
5. Target compounds from other fractions and suspected laboratory contaminants should be marked as "non-reportable".
6. Other Case factors may influence TIC judgments. If a sample TIC match is poor, but other samples have a TIC with a valid library match, similar RRT, and the same ions, infer identification information from the other sample TIC results.
7. Note in the Data Review Narrative any changes made to the reported data or any concerns regarding TIC identifications.
8. Note, for Contract Laboratory COR action, failure to properly evaluate and report TICs

All criteria were met __X__
Criteria were not met
and/or see below _____

SAMPLE QUANTITATION AND REPORTED CONTRACT REQUIRED QUANTITATION LIMITS (CRQLS)

Action:

1. If any discrepancies are found, the Region's designated representative may contact the laboratory to obtain additional information that could resolve any differences. If a discrepancy remains unresolved, the reviewer must use professional judgment to decide which value is the most accurate. Under these circumstances, the reviewer may determine that qualification of data is warranted. Note in the Data Review Narrative a description of the reasons for data qualification and the qualification that is applied to the data.
2. For non-aqueous samples, in the percent moisture is less than 70.0%, no qualification of the data is necessary. If the percent moisture is greater than or equal to 70.0% and less than 90.0%, qualify detects as estimated (J) and non-detects as approximated (UJ). If the percent moisture is greater than or equal to 90.0%, qualify detects as estimated (J) and non-detects as unusable (R) (see Table below).
3. Note, for Contract Laboratory COR action, numerous or significant failures to accurately quantify the target compounds or to properly evaluate and adjust CRQLs.
4. Results between MDL and CRQL should be qualified as estimated "J".
5. Results < MDL should be reported at the CRQL and qualified "U". MDLs themselves are not reported.

Table. Percent Moisture Actions for Low/Medium Volatiles Analysis for Non-Aqueous Samples

Criteria	Action	
	Detected Associated Compounds	Non-detected Associated Compounds
% Moisture < 70.0	No qualification	
70.0 < % Moisture < 90.0	J	UJ
% Moisture > 90.0	J	R

The sample quantitation evaluation is to verify laboratory quantitation results. In the space below, please show a minimum of one sample calculation:

Sample ID

FA35235-1MS Benzene RF = 1.224

[ ] = (833642)(50)/(1.224)(1334590) = 25.52 ppb Ok

B. Percent Solids

List samples which have ≥ 70 % solids

All criteria were met __X__
Criteria were not met
and/or see below _____

QUANTITATION LIMITS

A. Dilution performed

SAMPLE ID	DILUTION FACTOR	REASON FOR DILUTION

All criteria were met __X__
Criteria were not met
and/or see below _____

OTHER ISSUES

A. System Performance

List samples qualified based on the degradation of system performance during simple analysis:

Sample ID	Comments	Actions
_____	_____	_____
_No_degradation_of_system_performance_observed.		_____
_____	_____	_____
_____	_____	_____

Action:

Use professional judgment to qualify the data if it is determined that system performance has degraded during sample analyses. Inform the Contract Laboratory Program COR any action as a result of degradation of system performance which significantly affected the data.

B. Overall Assessment of Data

List samples qualified based on other issues:

Sample ID	Comments	Actions
_____	_____	_____
_No_additional_issues_observed_that_require_qualification_of_the_data._Results_are_valid_and__ _can_be_used_for_decission_purposes._____		_____
_____	_____	_____
_____	_____	_____

Action:

1. Use professional judgment to determine if there is any need to qualify data which were not qualified based on the Quality Control (QC) criteria previously discussed.
2. Write a brief narrative to give the user an indication of the analytical limitations of the data. Inform the Contract Laboratory COR the action, any inconsistency of the data with the Sample Delivery Group (SDG) Narrative. If sufficient information on the intended use and required quality of the data is available, the reviewer should include their assessment of the usability of the data within the given context. This may be used as part of a formal Data Quality Assessment (DQA).